

(12) UK Patent Application (19) GB (11) 2 057 042 A

(21) Application No 8027438
(22) Date of filing 22 Aug 1980

(30) Priority data

(31) 79/29875

(32) 29 Aug 1979

(33) United Kingdom (GB)

(43) Application published
25 Mar 1981

(51) INT CL³
E04G 17/08

(52) Domestic classification
E1S 4A SFA

(56) Documents cited

GB 1260743

GB 1208228

GB 1202462

GB 1158041

GB 1103160

GB 790481

US 3746297A

US 3589666A

(58) Field of search

E1S

(71) Applicants

Tower Scaffolding

(Bristol) Limited, Days

Road, Bristol BS2 0QS

(72) Inventor

Anthony Edward Fowles

(74) Agents

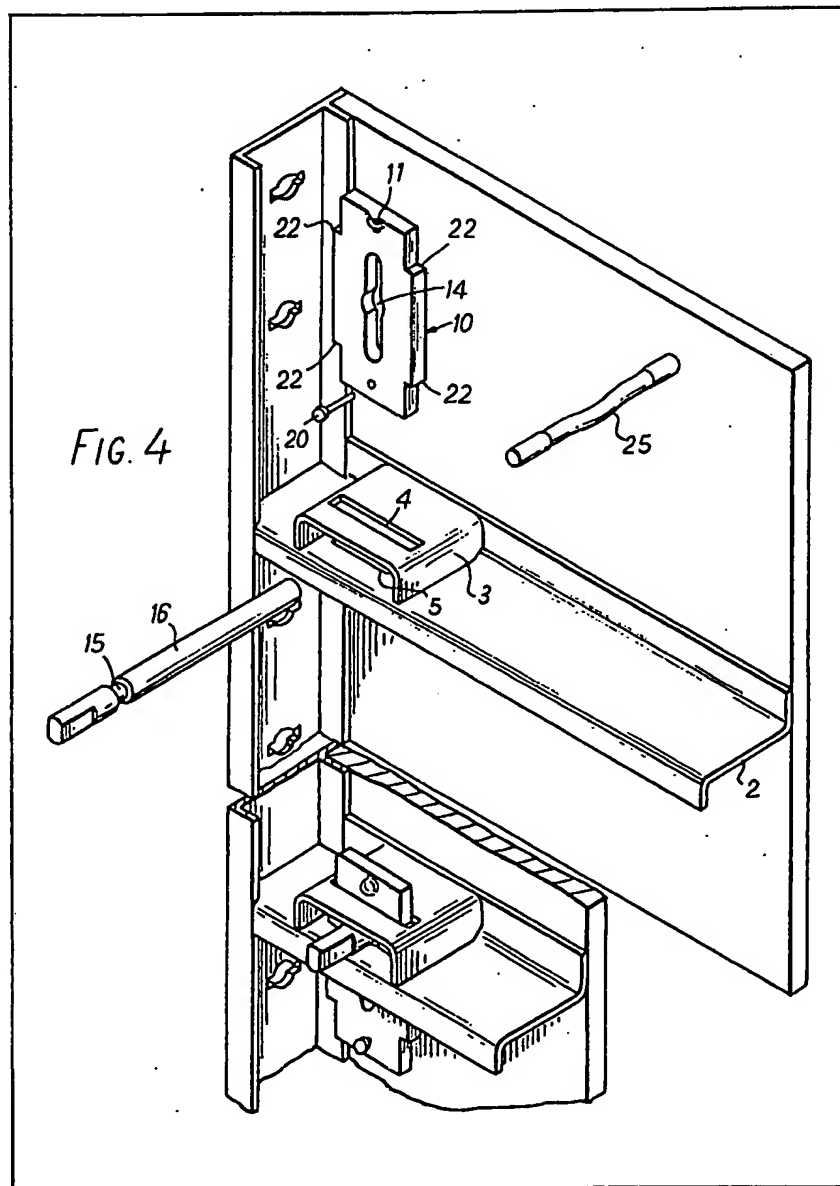
D. Young & Co., 10 Staple

Inn, London WC1V 7RD

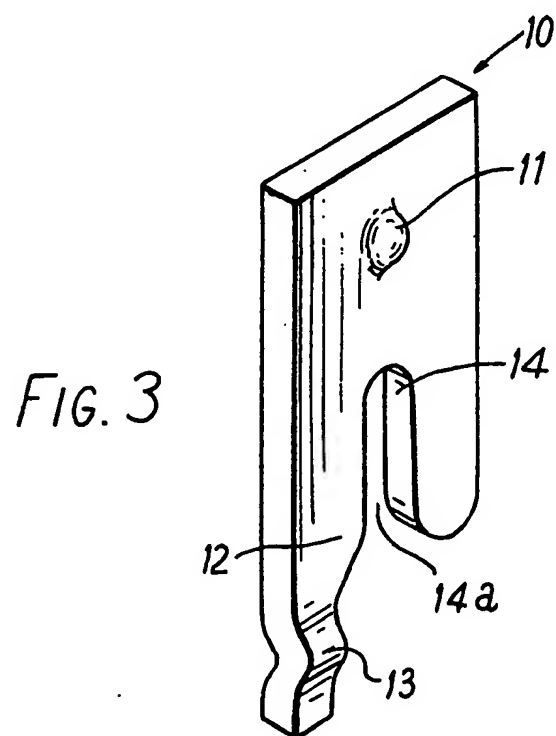
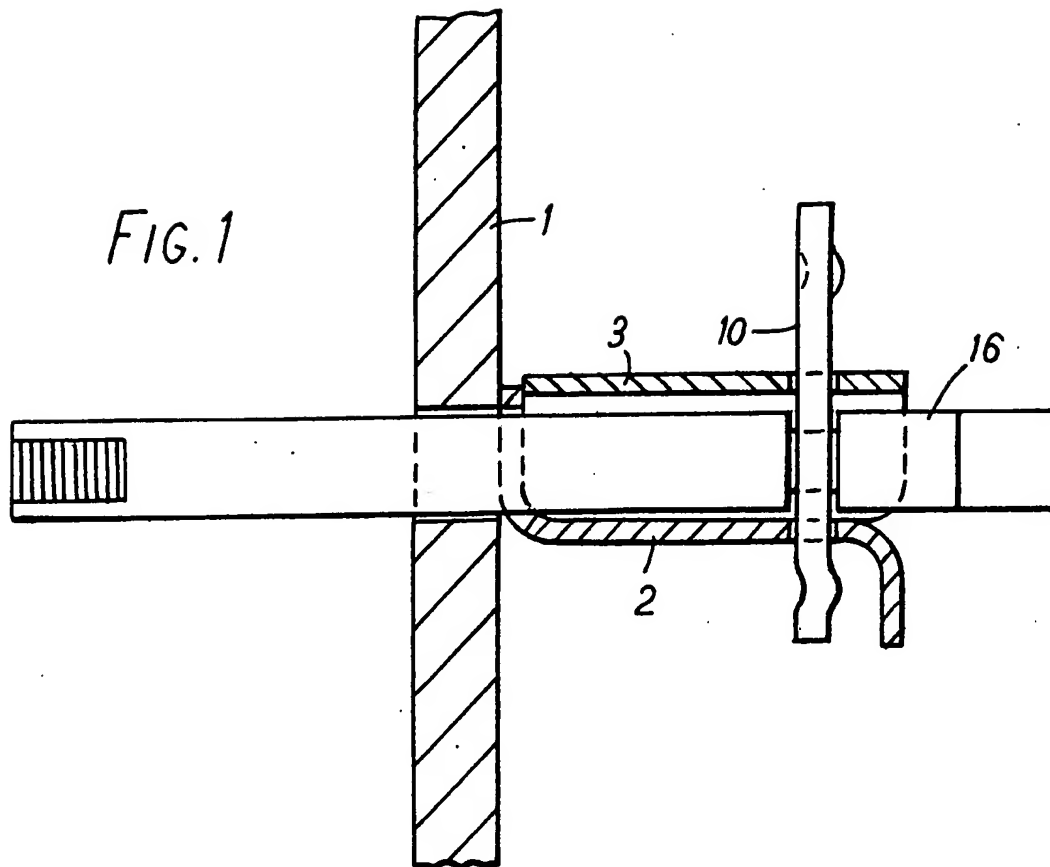
(54) Shuttering

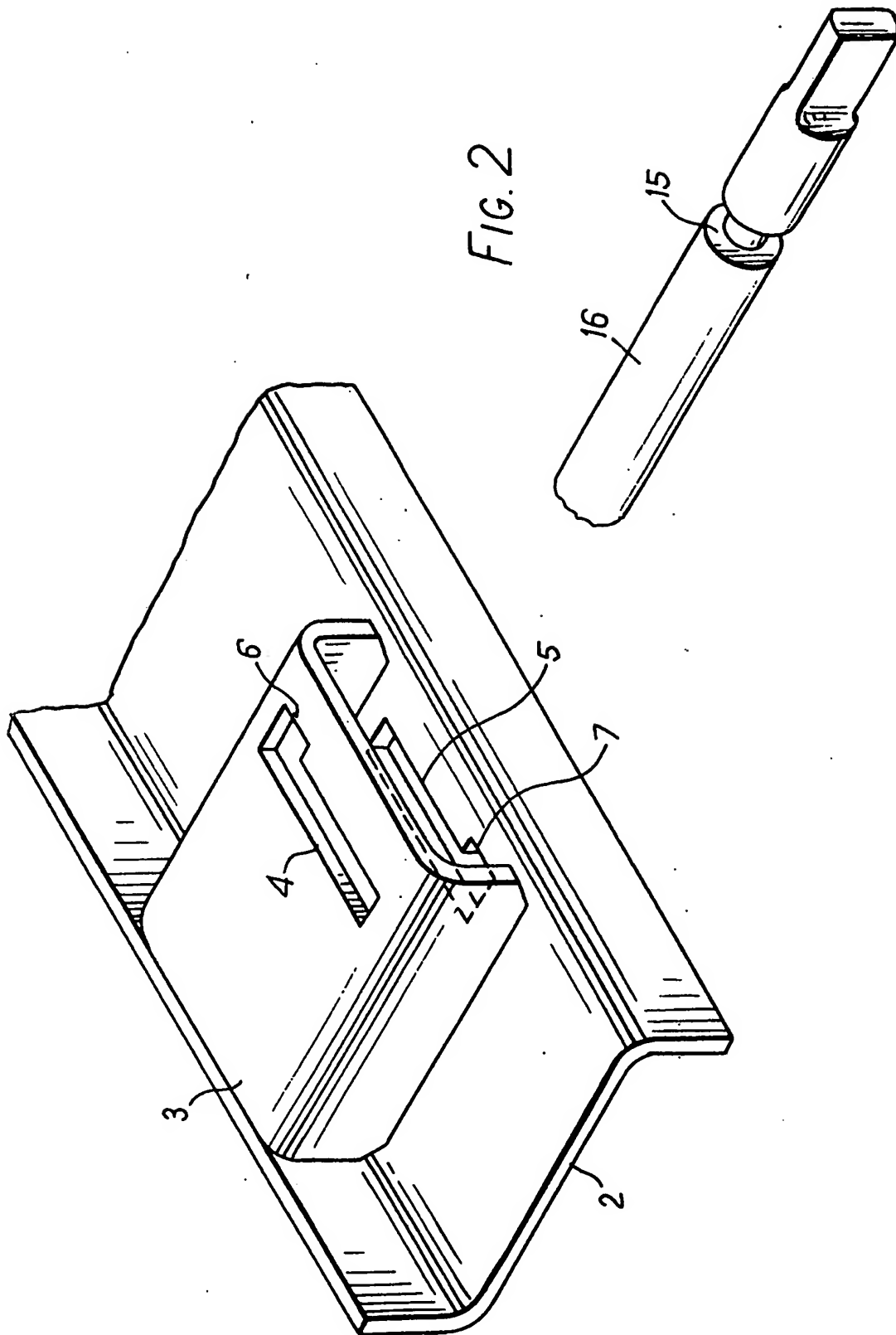
(57) A shuttering tie is secured to a shuttering panel 1 by a captive key 10 in the form of a metal plate with an

open ended or keyhole slot 14 which engages a peripheral groove 15 in the tie. The key 10 is slidable in a pair of aligned guide slots 4, 5 on the panel 1.



GB 2 057 042 A





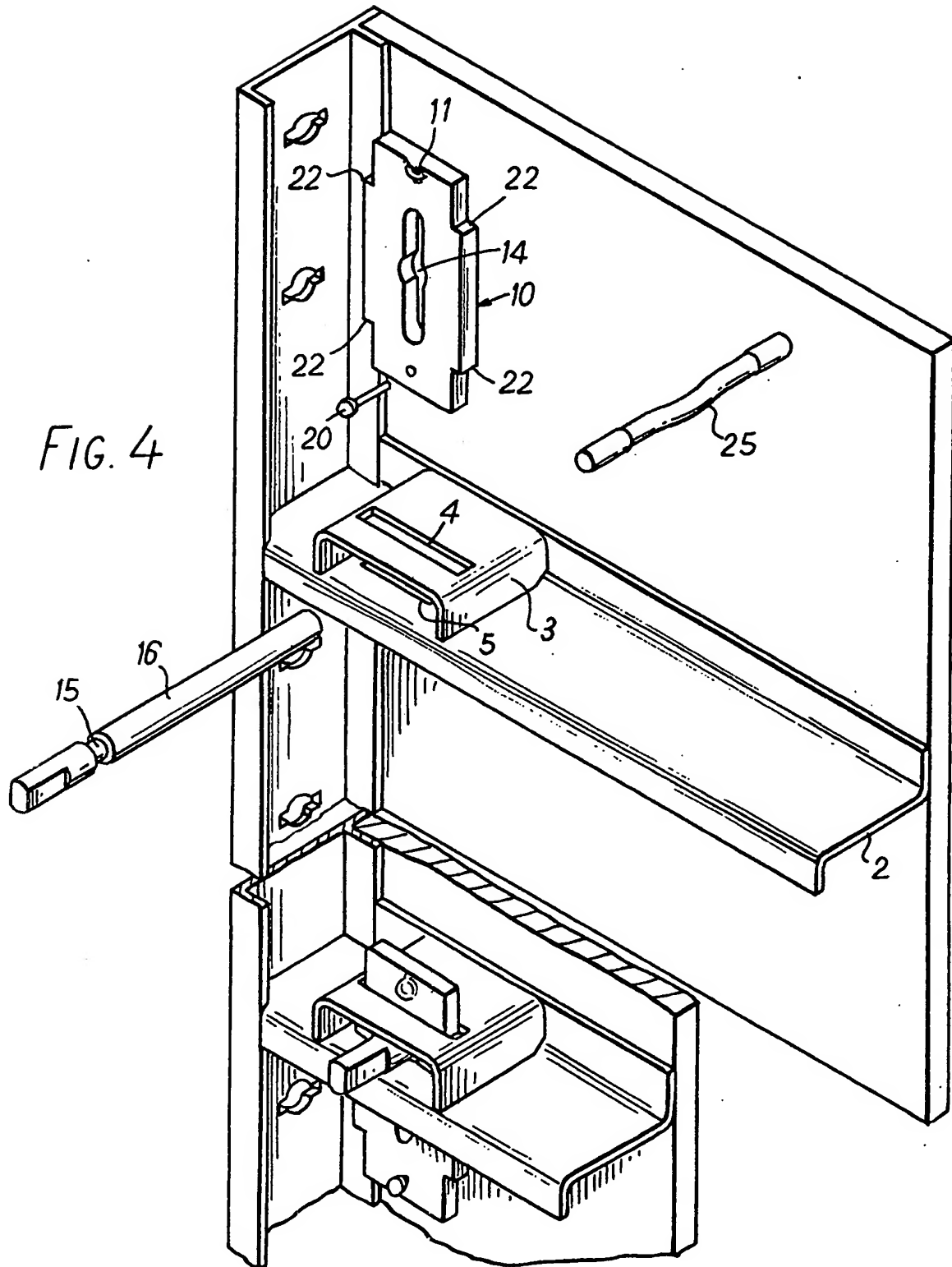


FIG. 5

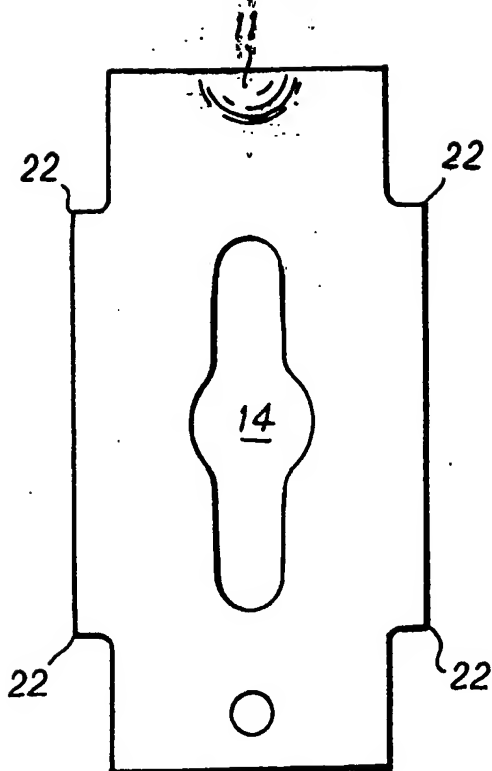


FIG. 6

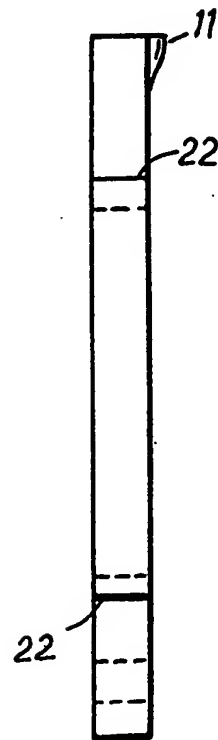
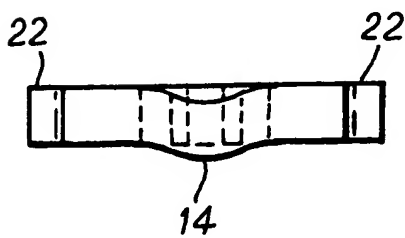


FIG. 7



SPECIFICATION Shuttering

This invention relates to shuttering panels which are mounted in spaced relation to provide a cavity into which concrete or the like is poured. Such panels are conventionally held together in their spaced relation by means of ties which pass through both panels. After the concrete has set part of the ties is removed so that nothing is left projecting from the set concrete.

One system is the through-bolt system in which a single bolt is used with a plastics sleeve thereon in the part of its length between the panels. This sleeve remains in the concrete and permits the bolt to be withdrawn but has the disadvantage that the final concrete structure has a through-hole (i.e. the bore of the plastics sleeve).

Another system is the snap-tie system in which the tie is a flat plate which extends through both panels and is keyed to both of them. The tie remains in the set concrete but has a point of weakness adjacent each end just below the concrete surface which permits it to be broken off by flexing it to and fro. This system tends to lead to damage of the concrete surface. Also if the panel spacing has to be changed, a corresponding new set of ties has to be used.

A third system is the coil tie system in which the tie comprises a plurality of rigid bars with springs welded to and extending from each end. Frustoconical tubular spacers are screwed onto the springs with their smaller ends innermost, their larger ends abutting the inner faces of the shuttering panels. The tie is secured by bolts passing through the respective panels into the respective springs. This arrangement has the advantage of positive spacing of the panels but as the spacers are between the panels, the tie has to be fixed first to one panel and then to the other panel. Also the part remaining in the concrete, i.e. everything except the bolts and spacers, is comparatively costly.

A fourth system is the she-bolt system. A central tie rod, of predetermined length corresponding to the distance between the panels less a fixed dimension being the cover to the concrete on each side has male threads on each end which engage respective female threads in two she-bolts.

The she-bolts are rods which are externally threaded at their outer ends and carry nuts which directly or indirectly engage the outside of the panels. The assembly of two she-bolts (without the nuts) and tie rod can be simply passed through both panels from the outside of one of them. When the concrete is set, the nuts are removed and the she-bolts are unscrewed from the tie rod which remains in the concrete. For this purpose it is convenient to have flats at the free end of the she-bolt so arranged that they do not interfere with screwing the nut on and off. The tie rod is conveniently slightly crimped to prevent rotation in the set concrete. This system has many advantages but although many attempts have

been made it has not previously proved readily adaptable to giving a foolproof arrangement for positive spacing of the panels.

An arrangement has been proposed to prevent overtightening of a nut on a she-bolt. This arrangement includes a peripheral groove in the she-bolt at the inner end of the externally threaded part and a washer with a keyhole aperture which, at its narrower end, engages in the groove. The nut can therefore not be tightened beyond a certain point. This arrangement also proposes to provide a channel-shaped lip on the washer which, when the washer is operative, engages a flange on the panel. Positive location of the panel is thus achieved. It should however be noted that the washer in this proposal is relatively thin and could not securely connect the bolt to the panel without the stiffening given by the nut. Furthermore, the panel must be used the right way up as otherwise the operative position of the washer is the uppermost position and there is a risk that it will drop to an inoperative position. Shuttering systems have to be made as foolproof as possible and it is with this in mind that the present invention has been developed.

According to one aspect of the invention we provide a shuttering arrangement in which tie members particularly those which can be removed from the set material by sliding or unscrewing are transversely engaged by keys associated with the shuttering panels. Other aspects of the invention are hereinafter set out in the claims.

The keys could engage diametrical openings through the bolts but preferably they are bifurcated and engage flats or a peripheral groove on the tie members.

The invention could be applied to a through bolt but is particularly intended for a she-bolt system. Of course with such a system the external thread at the outer end of the she-bolt would no longer be needed.

The key is preferably captive in an opening in the panel adjacent to the hole for the tie and a particularly advantageous arrangement for this purpose will hereinafter be described. Not all the holes will necessarily be used for a particular job and the use of captive keys permits the tie holes to be used to be set up with keys at the start of the operation e.g. by a foreman. Thereafter a less skilled labourer could be instructed to put ties only in holes provided with keys each time the panel is set up.

Embodiments of the invention will now be briefly described with reference to the accompanying drawings in which:—

Fig. 1 is a vertical section through a first embodiment of a panel and she-bolt;

Fig. 2 is a view of the Fig. 1 embodiment from above and one side showing part of a shuttering panel (without the key) and part of a she-bolt before placement in position;

Fig. 3 is a similar view of a key designed to cooperate with panel shown in Fig. 2.

Fig. 4 is a third angle projection of a second embodiment of the invention showing a panel and

two ties (the upper one being shown in an exploded view); and

Figs. 5, 6 and 7 are respectively a front elevation, an end elevation and a plan view of a slightly modified form of the key shown in Fig. 4.

Referring first to Fig. 2 the panel 1 has welded thereto a Z-shaped flange 2. Welded on the flange 2 is an inverted channel member 3, the member 3 and the flange having aligned guide slots 4 and 5.

The slot 4 has a lateral enlargement 6 at one end and the slot 5 has a lateral enlargement 7 at the other end.

The metal key or wedge 10 shown in Fig. 3 has a dimple 11 wider than the main width of slots 4 and 5 and, on leg 12, a crimp 13 which is similarly wider than the main width of slots 4 and 5 (but not of enlargements 6 and 7). The key 10 has an open-ended slot 14 with a lead-in 14a and slot 14 in use engages the bottom of the peripheral groove 15 on the she-bolt 16. The key 10 is mounted on the panel by passing leg 12 through enlargement 6, moving the key to the left till it fully corresponds to slot 4, and then dropping it down through slot 5. The key is thus effectively captive but is easily removable by the reverse series of operations.

The operation of the key 10 will be clear from Fig. 1. If, as is preferred, a light force fit is intended, the key may be tapped down into engagement with she-bolt 16. Similarly it can be tapped upwards to release she-bolt 16.

The embodiment shown in Fig. 4 is basically similar to that shown in Figs. 1—3 and the same reference numerals are used to designate similar parts. It will be noted that here the slots 4 and 5 do not have enlargements and the key 10 is made captive by passing a nail 20 or the like through a hole 21 therein after the key 10 has been passed through slots 4 and 5. The nail 20 may thereafter be bent to prevent it falling out.

The key 10 is a flat plate having a dimple 11 and a double keyhole slot 14 which permits it to be used either way up. Furthermore if the structure shown in Fig. 4 is turned on its side and the key 10 is in its locking position one of the four shoulders 22 will engage an edge of slot 4, 5 due to slight tilting of the key 10 under gravity and will therefore prevent the key 10 moving to its release position e.g. when the concrete is being vibrated.

In Fig. 4, a central tie rod is shown at 25.

CLAIMS

1. A shuttering tie system comprising a shuttering tie and a key transversely engageable therewith, the key being associated in use with a shuttering panel.

2. A system according to claim 1 wherein the tie has flats or a peripheral groove inwardly of its

end and the key comprises a plate having a slot engageable therewith.

3. A system according to Claim 2, wherein the slot is open-ended.

4. A system according to Claim 2, wherein the slot is a key-hole slot.

5. A system according to Claim 4, wherein the slot is a double key-hole slot such that the key can be used either way up.

6. A system according to any one of Claims 2—5 wherein the plate has a dimple at or adjacent one end to prevent it passing completely through one of two aligned guide slots provided on the shuttering panel.

7. A system according to Claim 6, wherein the plate has a hole at the other end for receiving means to prevent its removal from the guide slots.

8. A system according to Claim 6 or 7, wherein the plate has one or more shoulders on at least one of the edges thereof which extend in the same direction as the slot in the plate, the shoulders being arranged to lock against one of the guide slot edges when the key is used horizontally and is in a tie-locking position.

9. A shuttering assembly comprising shuttering panels and shuttering tie systems according to any preceding claim.

10. A shuttering panel having captive thereon a plurality of shuttering tie keys.

11. A panel according to Claim 10, wherein each key comprises a plate having a slot transversely engageable with flats or a peripheral groove on a shuttering tie.

12. A panel according to Claim 11, wherein the slot is open ended.

13. A panel according to Claim 11, wherein the slot is a keyhole slot.

14. A panel according to Claim 13, wherein the slot is a double keyhole slot such that the key can be used either way up.

15. A panel according to any one of Claims 11—14, wherein the plate has a dimple at or adjacent one end to prevent it passing completely through one of two aligned guide slots provided on the shuttering panel.

16. A panel according to Claim 15, wherein the plate has a hole at the other end for receiving means to prevent its removal from the guide slots.

17. A panel according to Claim 15 or 16, wherein the plate has one or more shoulders on at least one of the edges thereof which extend in the same direction as the slot in the plate, the shoulders being arranged to lock against one of the guide slot edges when the key is used horizontally and is in a tie-locking position.

18. A shuttering tie key substantially as hereinbefore described with reference to Fig. 4 or Figs. 5—7 of the drawings.